



**UCLA** Institute of the Environment and Sustainability

# California Climate Change: Challenges and Collaborations

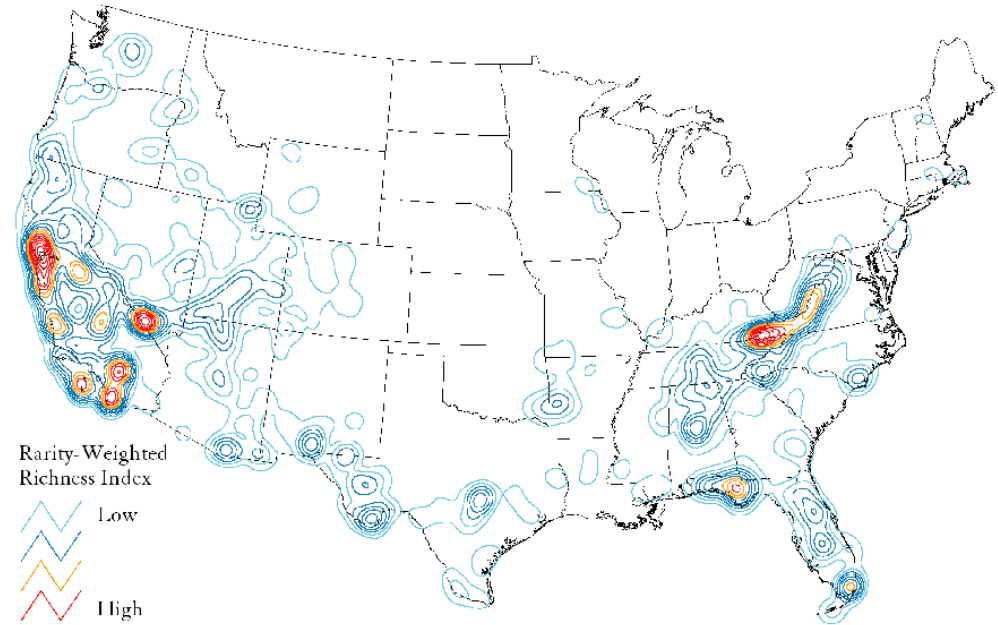
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Glen M MacDonald  
IoES UCLA



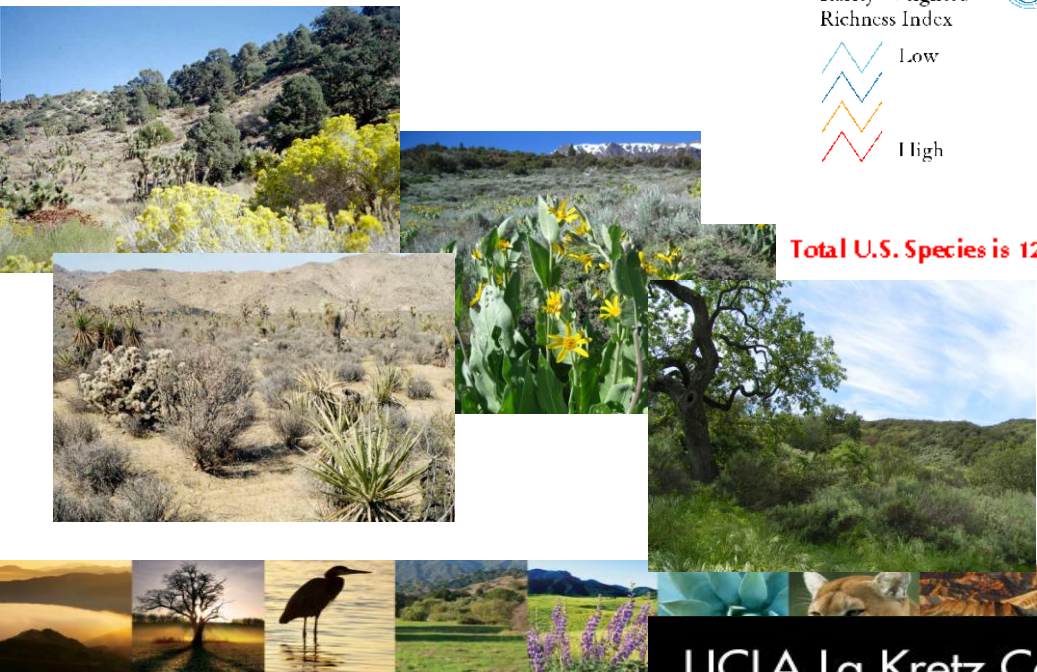
[www.environment.ucla.edu](http://www.environment.ucla.edu)

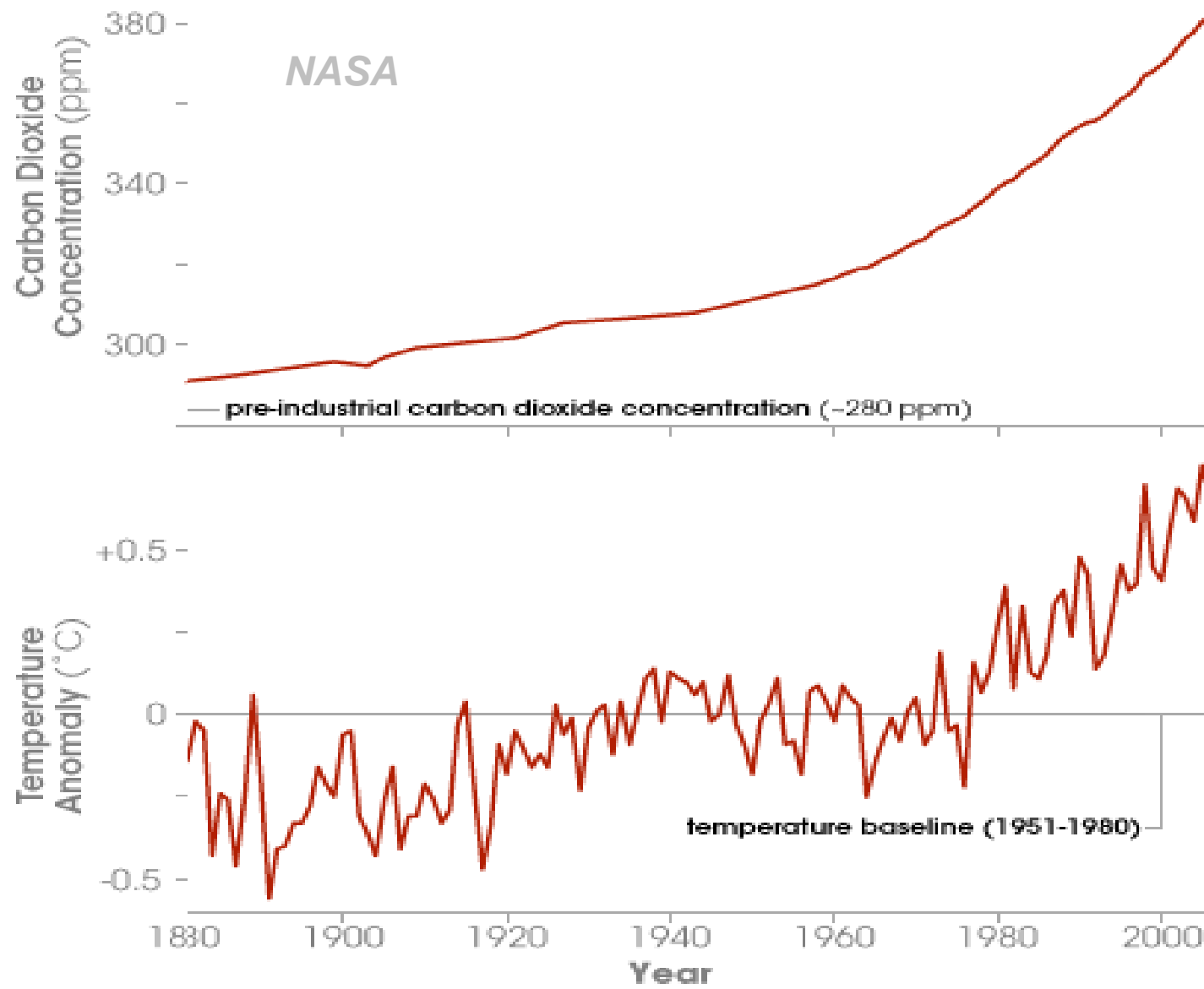
## Hot Spots of Rarity and Richness

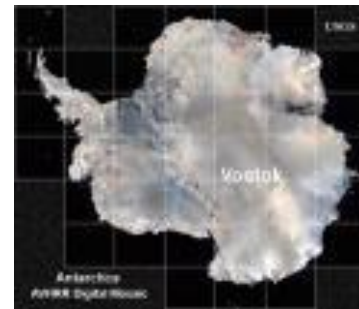


Source: *Precious Heritage* (2000) © TNC, ABI

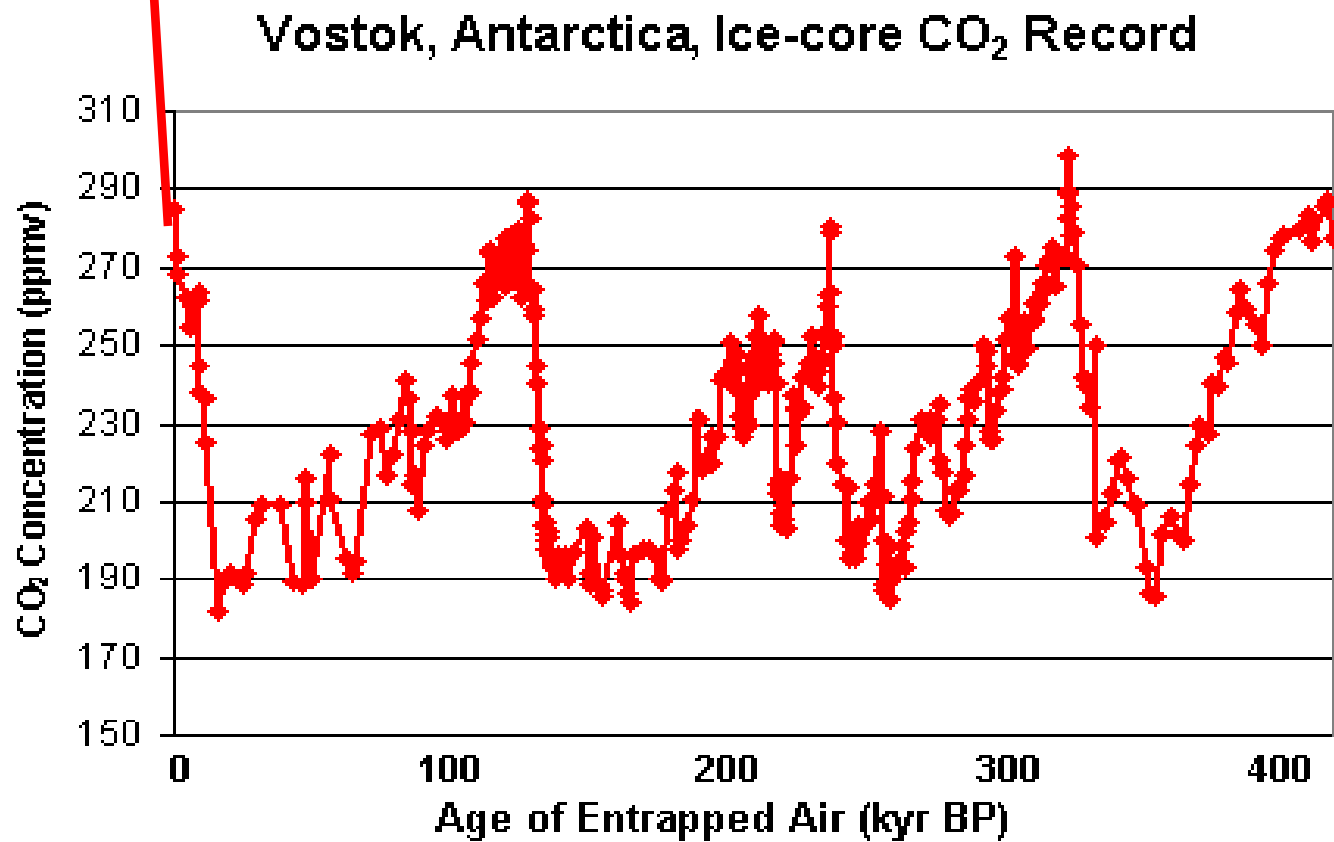
**Total U.S. Species is 1263. Numbers are not additive, a species often occurs in multiple states.**







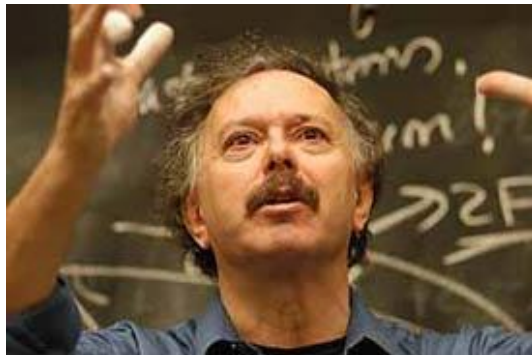
~ 390 ppmv today!



Source: Jean-Marc Barnola et al.



Charles G. Koch Charitable Foundation  
(\$150,000)



Richard Muller



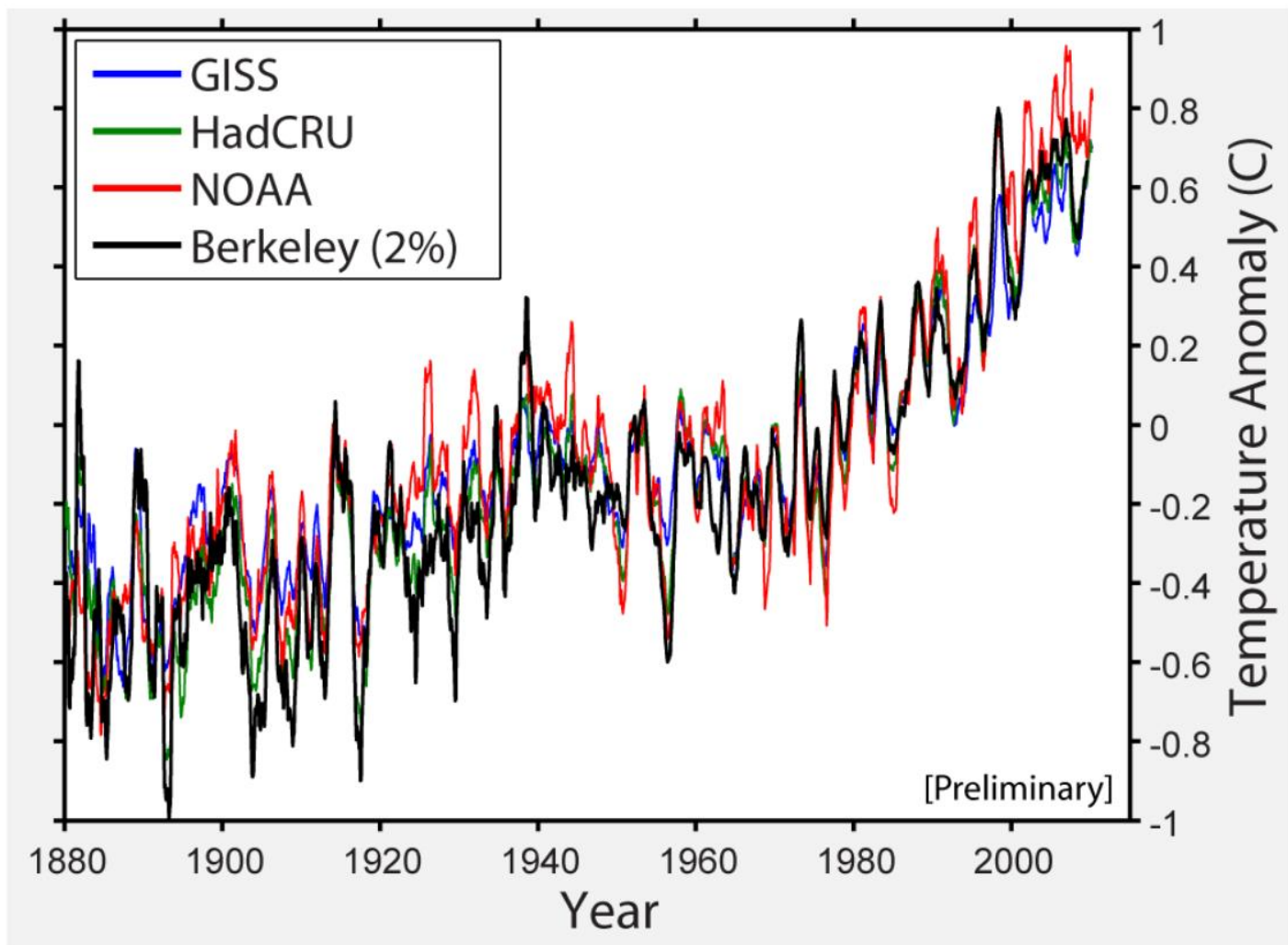
## U.S. House of Representatives Committee of Science, Space and Technology



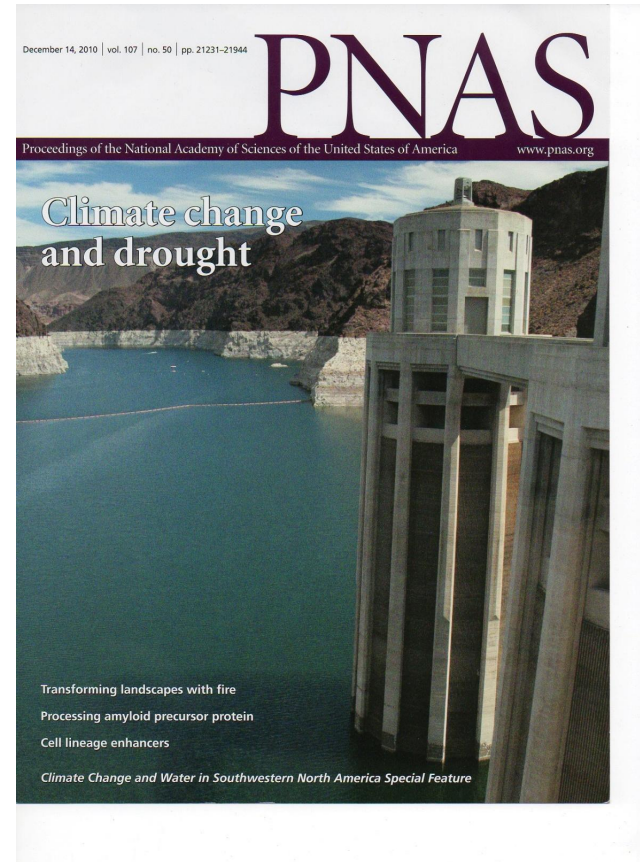
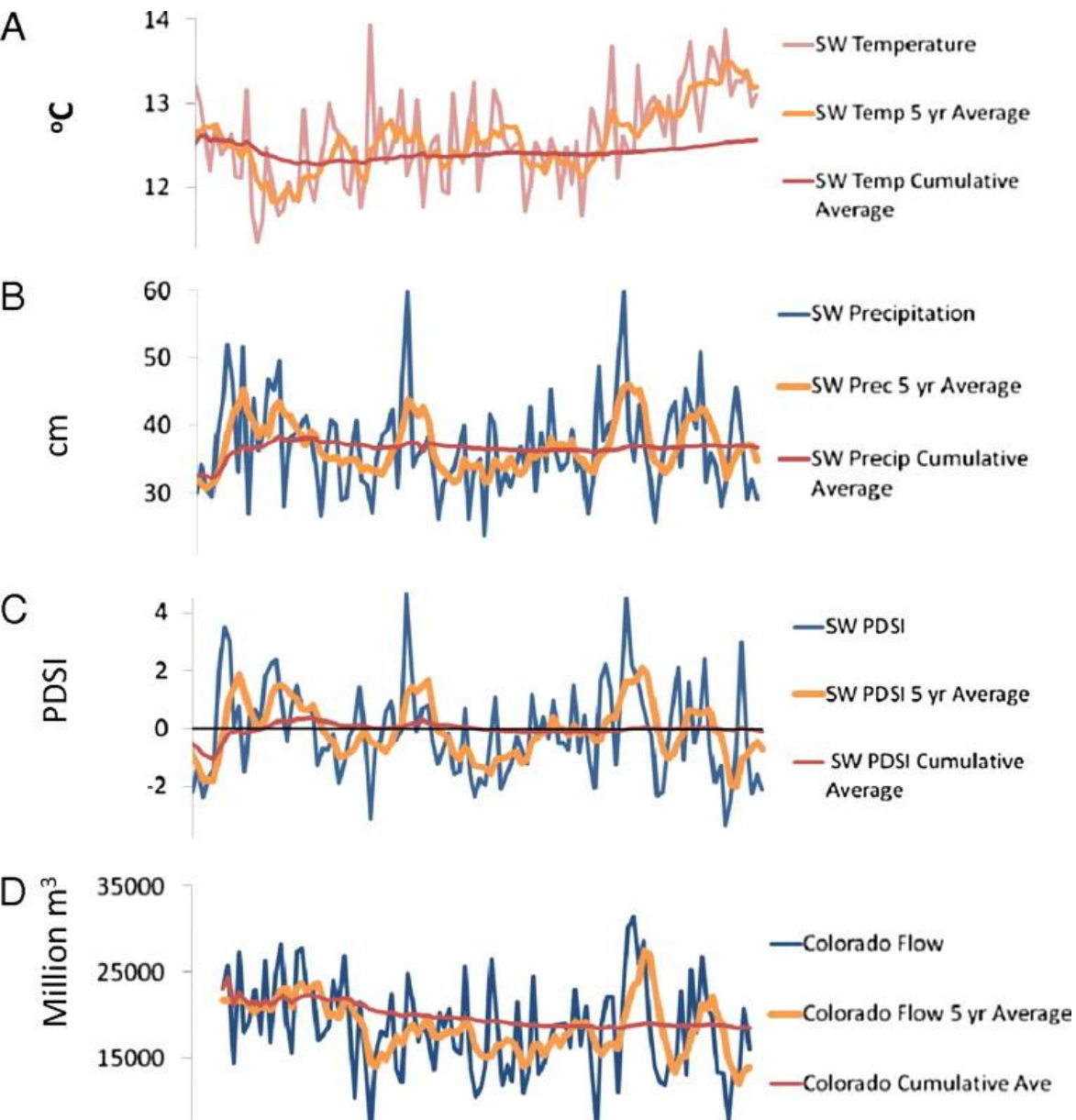
Rep. Ralph M. Hall, R-Texas, chairman of the House Science, Space and Technology Committee

Has sought to prohibit funds to implement a National Oceanic and Atmospheric Administration (NOAA) Climate Service



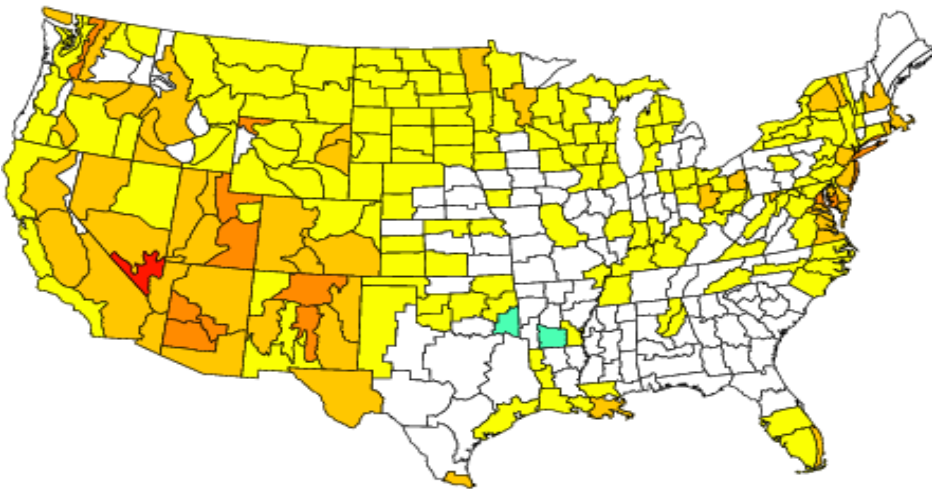


*“In our preliminary analysis of these stations, we found a warming trend that is shown in the figure. It is very similar to that reported by the prior groups: a rise of about 0.7 degrees C since 1957.”* STATEMENT TO THE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY OF THE UNITED STATES HOUSE OF REPRESENTATIVES by Professor Richard A. Muller March 31, 2011

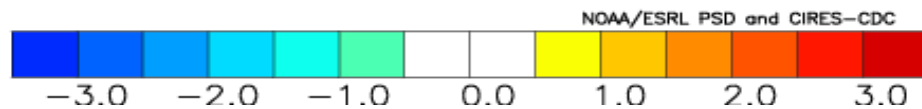


MacDonald 2010, PNAS

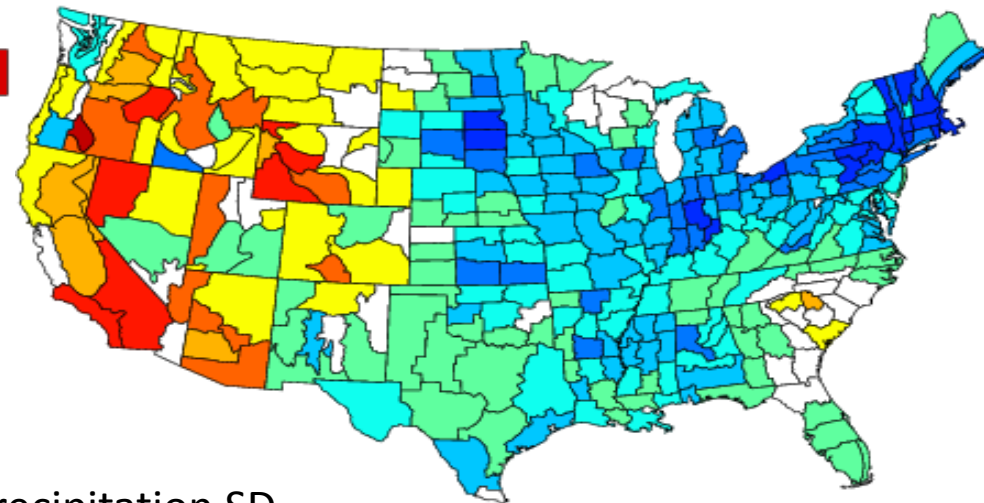




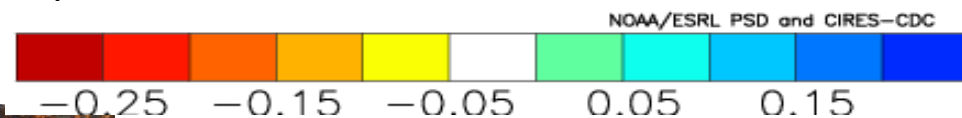
2001-2009



Temperature SD



Precipitation SD



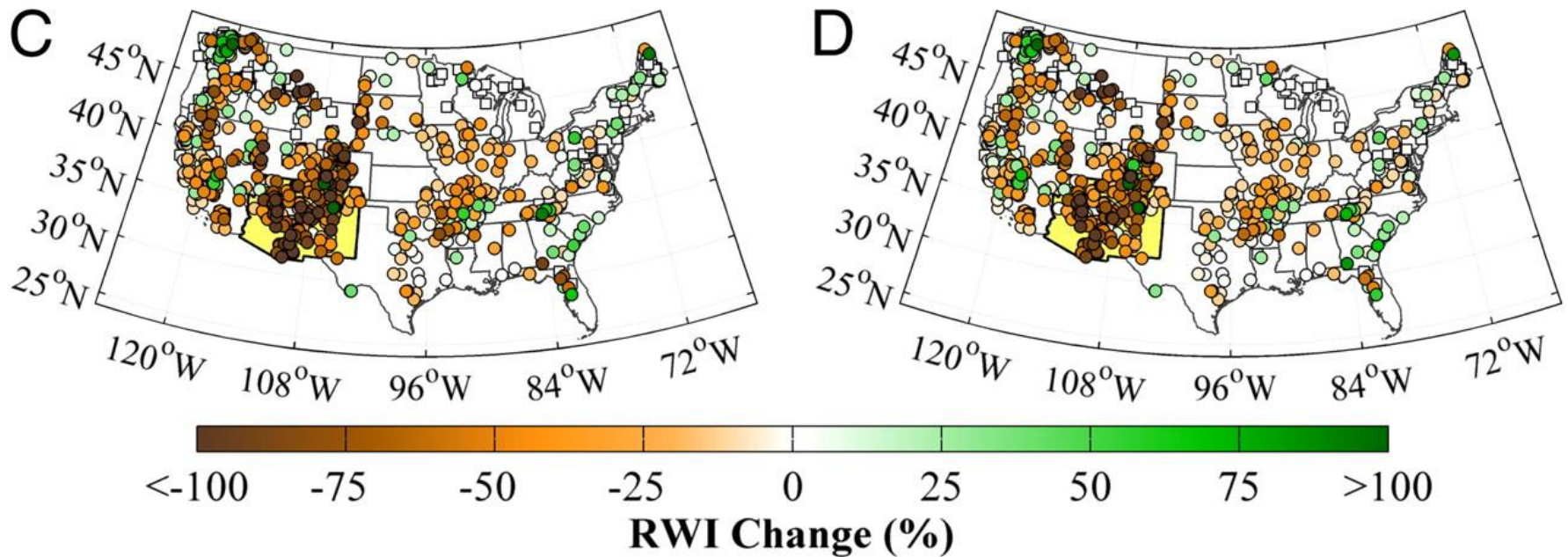
MacDonald, 2010, PNAS



## 20 Largest California Wildland Fires (By \*Acreage Burned)

| FIRE NAME/CAUSE                       | DATE           | COUNTY          | ACRES   | STRUCTURES | DEATHS |
|---------------------------------------|----------------|-----------------|---------|------------|--------|
| 1 CEDAR (HUMAN)                       | October 2003   | SAN DIEGO       | 273,246 | 2,820      | 15     |
| 2 ZACA (HUMAN)                        | July 2007      | SANTA BARBARA   | 240,207 | 1          | 0      |
| 3 BEAR WALLOW                         |                | SISKIYOU        | 192,038 |            |        |
| 4 MATILJA (UNDETERMINED)              | September 1932 | VENTURA         | 220,000 | 0          | 0      |
| 5 WITCH (POWERLINES)                  | October 2007   | SAN DIEGO       | 197,990 | 1,650      | 2      |
| 6 MARBLE CONE (LIGHTNING)             | July 1977      | MONTEREY        | 177,866 | 0          | 0      |
| 7 LAGUNA (POWERLINES)                 | September 1970 | SAN DIEGO       | 175,425 | 382        | 5      |
| 8 BASIN COMPLEX (LIGHTNING)           | June 2008      | MONTEREY        | 162,818 | 58         | 0      |
| 9 DAY FIRE (HUMAN)                    | September 2006 | VENTURA         | 162,702 | 11         | 0      |
| 10 MCNALLY (HUMAN)                    | July 2002      | TULARE          | 150,696 | 17         | 0      |
| 11 STANISLAUS COMPLEX (LIGHTNING)     | August 1987    | TUOLUMNE        | 145,980 | 28         | 1      |
| 12 STATION FIRE (UNDER INVESTIGATION) | August 2009    | LOS ANGELES     | 144,743 | 91         | 2      |
| 13 BIG BAR COMPLEX (LIGHTNING)        | August 1999    | TRINITY         | 140,948 | 0          | 0      |
| 14 CAMPBELL COMPLEX (POWERLINES)      | August 1990    | TEHAMA          | 125,892 | 27         | 0      |
| 15 WHEELER (ARSON)                    | July 1985      | VENTURA         | 118,000 | 26         | 0      |
| 16 SIMI (UNDER INVESTIGATION)         | October 2003   | VENTURA         | 108,204 | 300        | 0      |
| 17 HWY. 58 (VEHICLE)                  | August 1996    | SAN LUIS OBISPO | 106,668 | 13         | 0      |
| 18 IRON ALPS COMPLEX (LIGHTNING)      | June 2008      | TRINITY         | 105,805 | 2          | 10     |
| 19 CLAMPITT (POWERLINES)              | September 1970 | LOS ANGELES     | 105,212 | 86         | 4      |
| 20 BAR COMPLEX (LIGHTNING)            | July 2006      | TRINITY         | 100,414 | 0          | 0      |



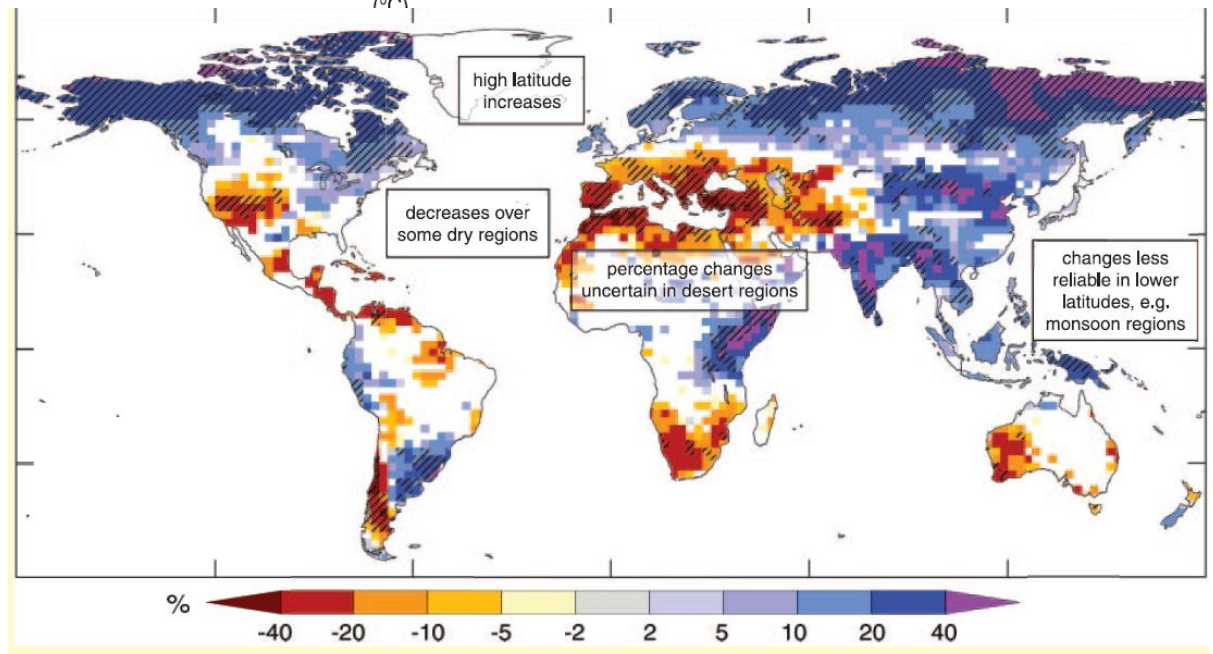
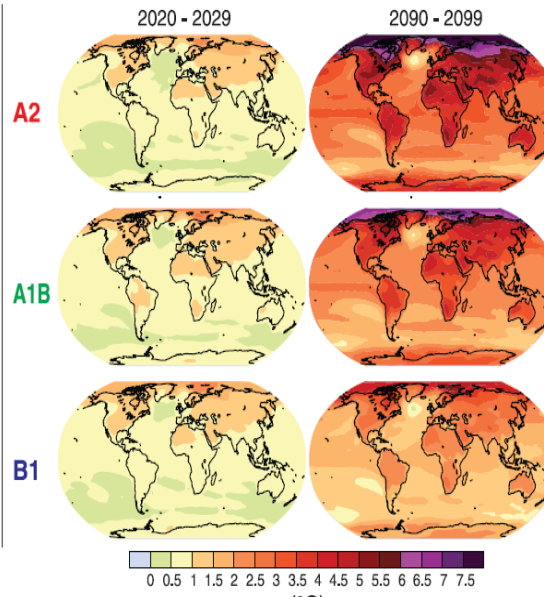
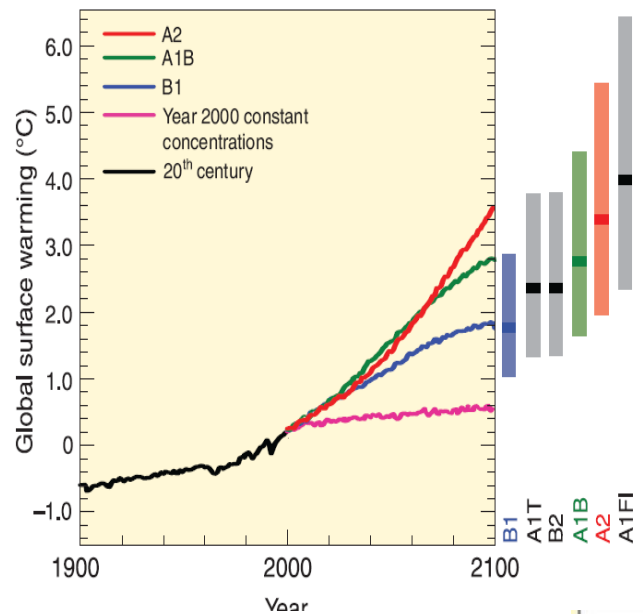


Williams et al 2010, PNAS



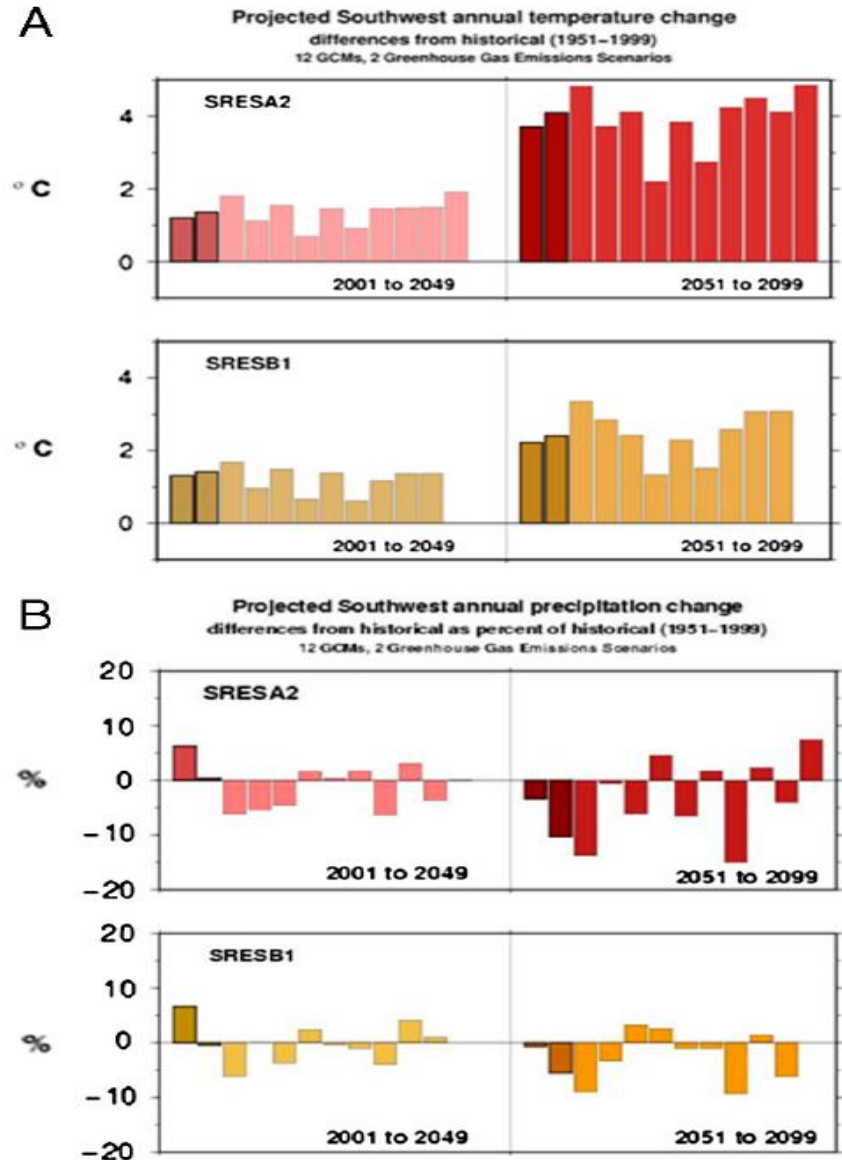


# Projections -



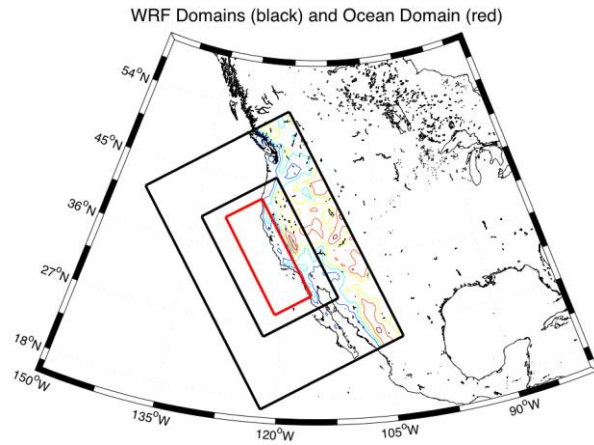


Cayan et al 2010 PNAS



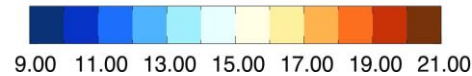
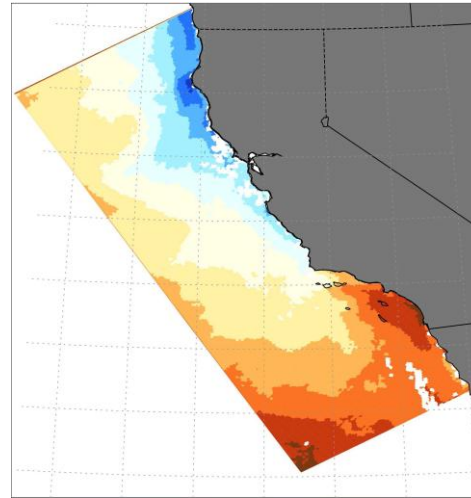


## UCLA Regional Climate Model

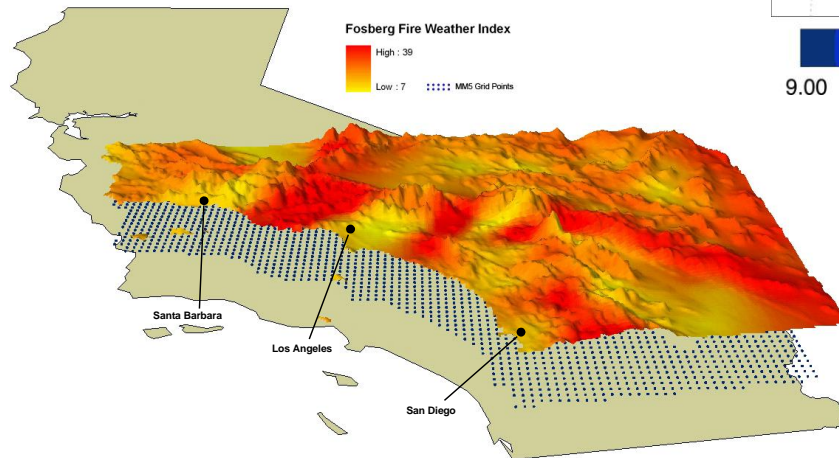
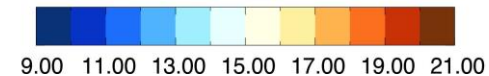
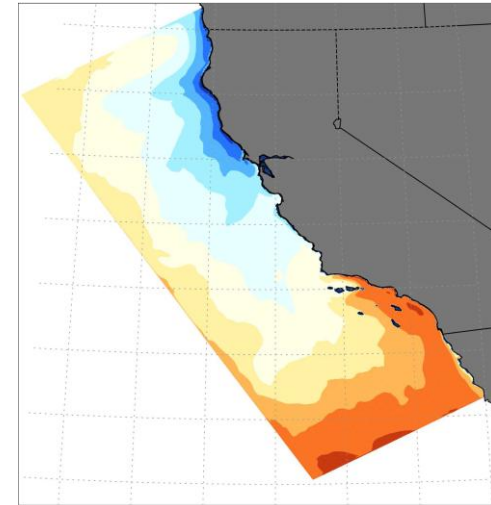


Sea surface temperature

Observed by MODIS satellite



Simulated by coupled model

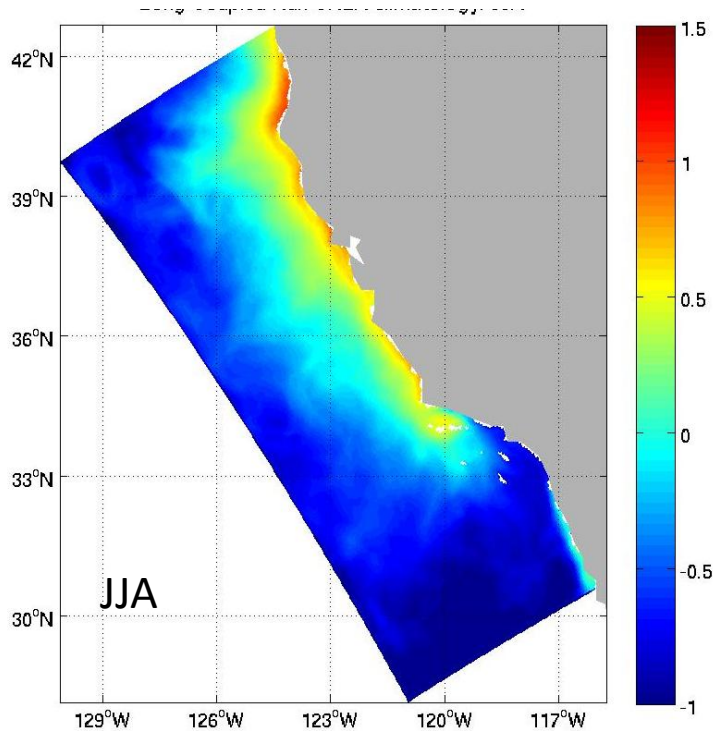


Alex Hall - UCLA

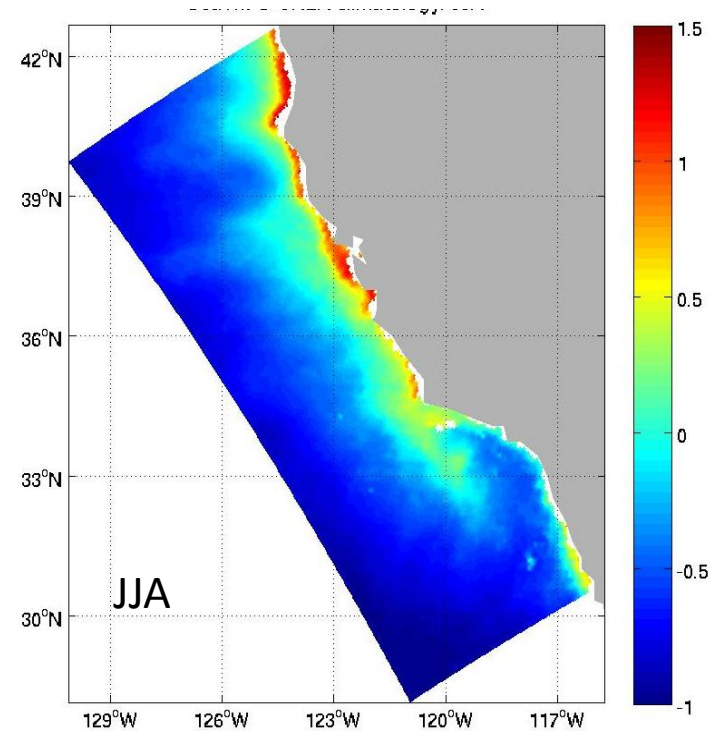


# Marine Ecosystem Validation

Simulated



Observed (SeaWiFS)

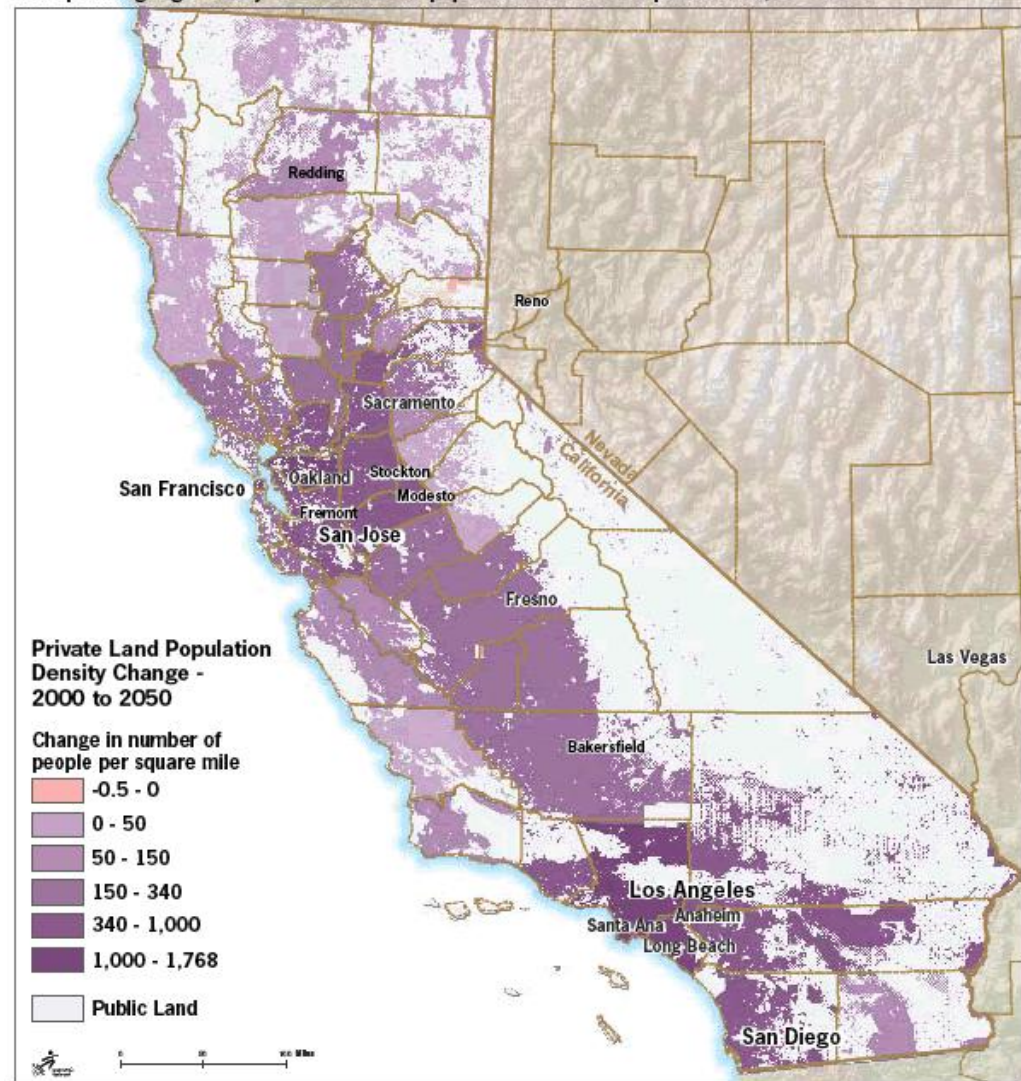


The model captures the high productivity of the near coastal zone, as well as the drop-off in productivity going south from the central California coast into the Southern California Bight





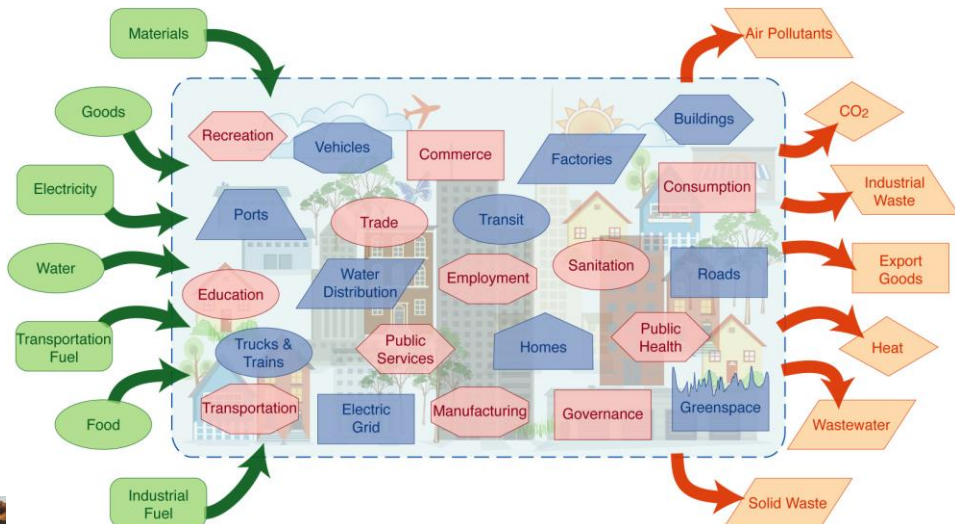
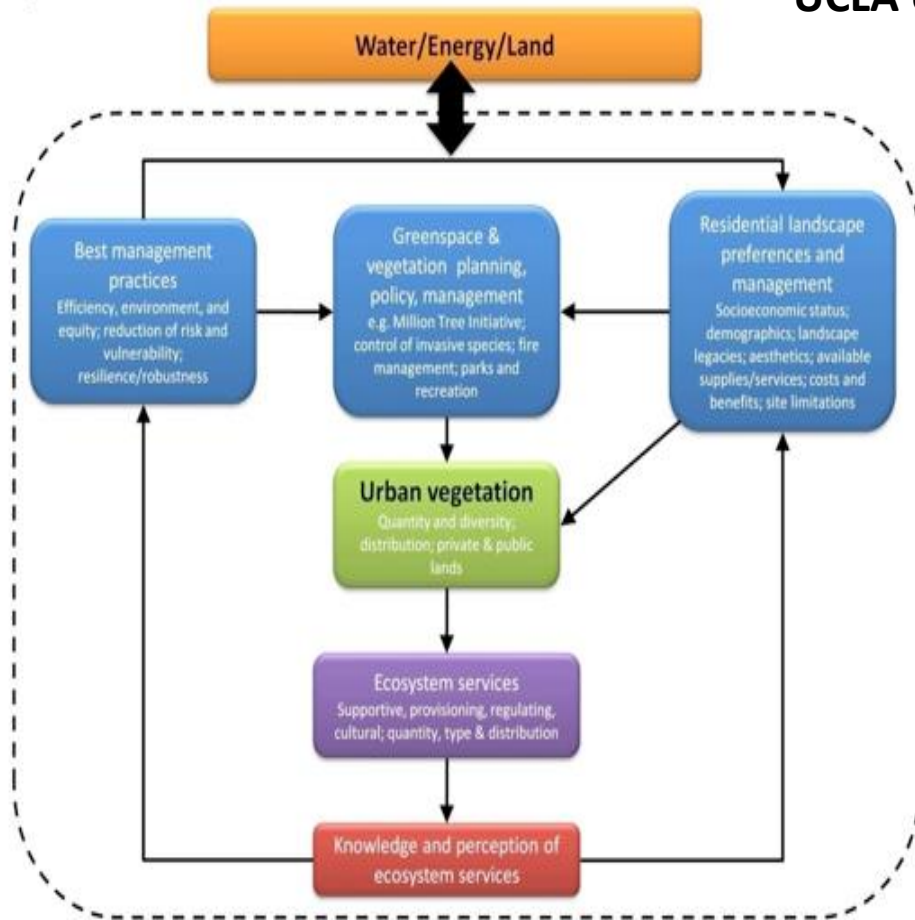
The sprawling region: Projected increase in population densities on private land, 2000-2050



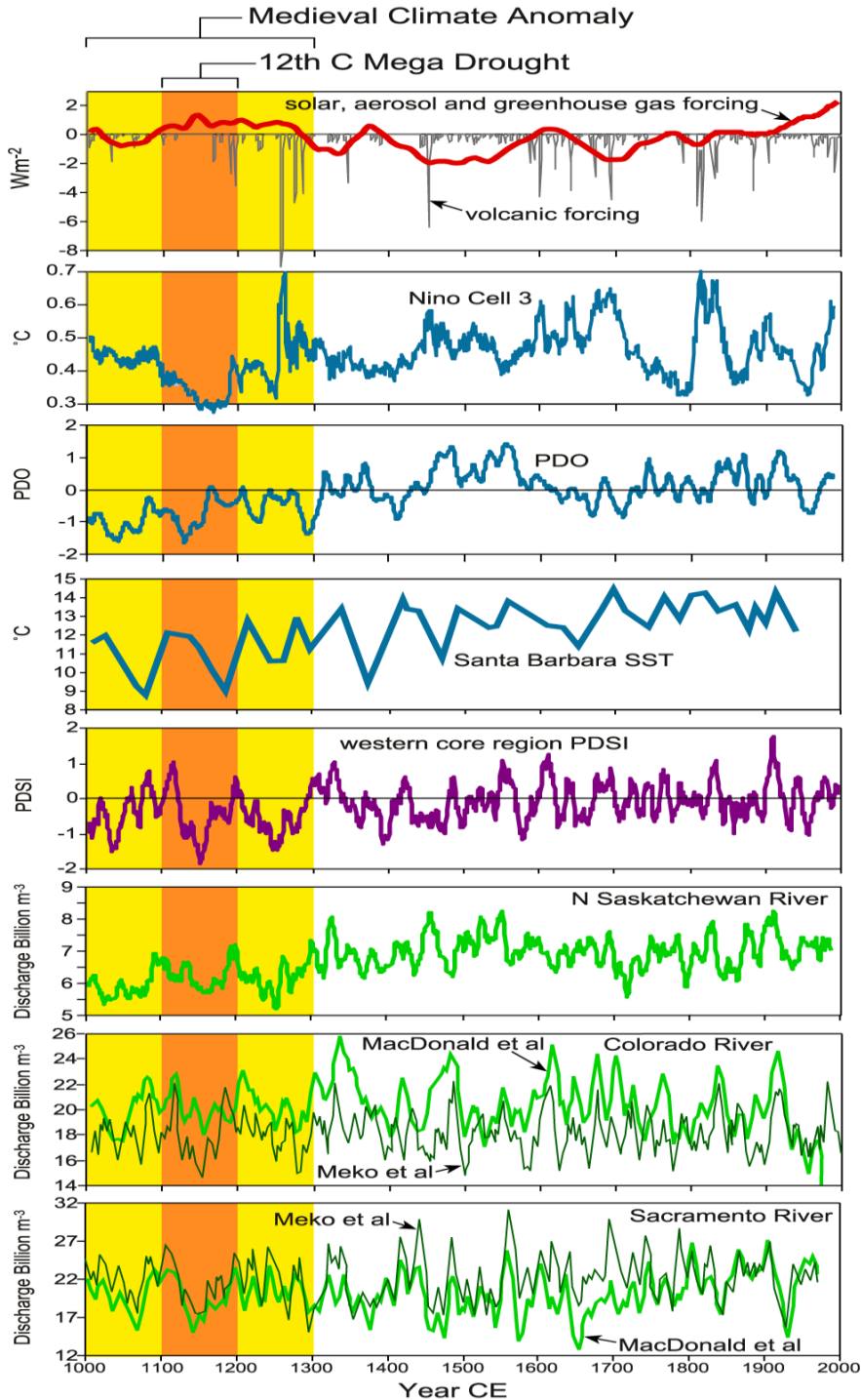
Source: CA Department of Finance, 2007. [www.dof.ca.gov/Research/Research.php](http://www.dof.ca.gov/Research/Research.php)



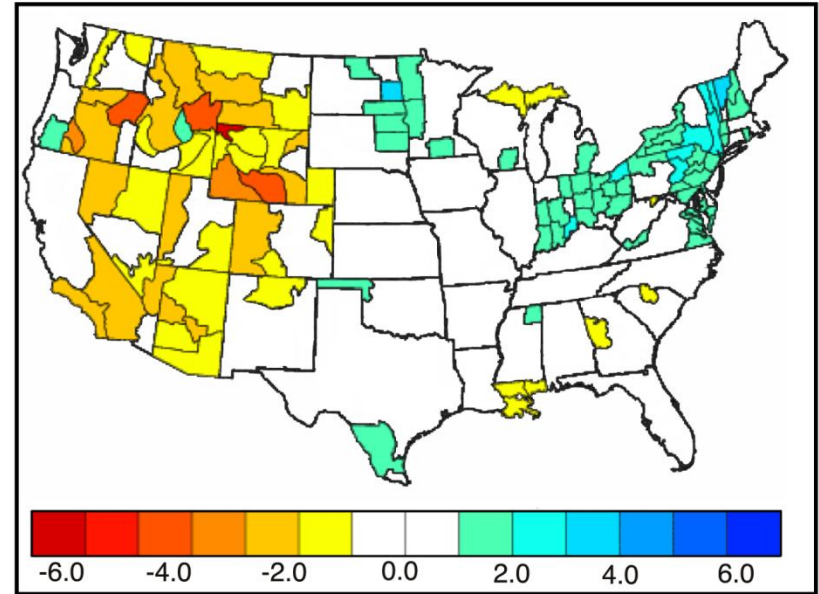
## UCLA ULTRA X, LARC and PIERS



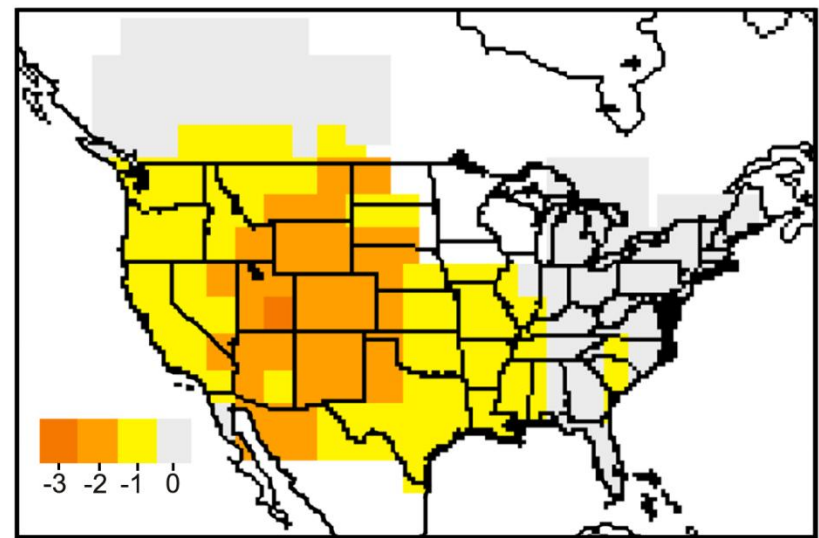




a. 2000-2007

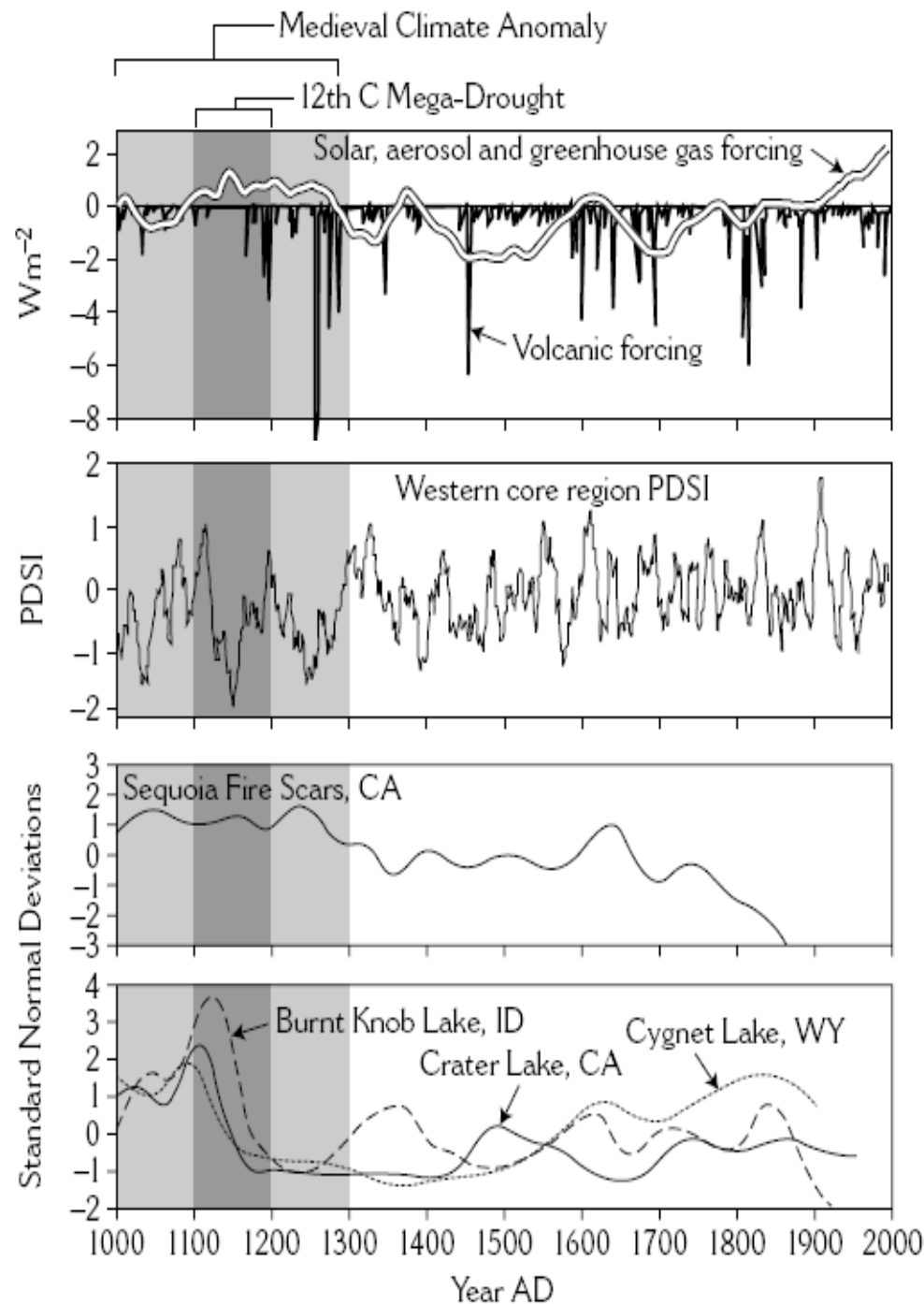


b. 1130-1180



MacDonald et al 2008 – see also  
Woodhouse et al 2010 PNAS



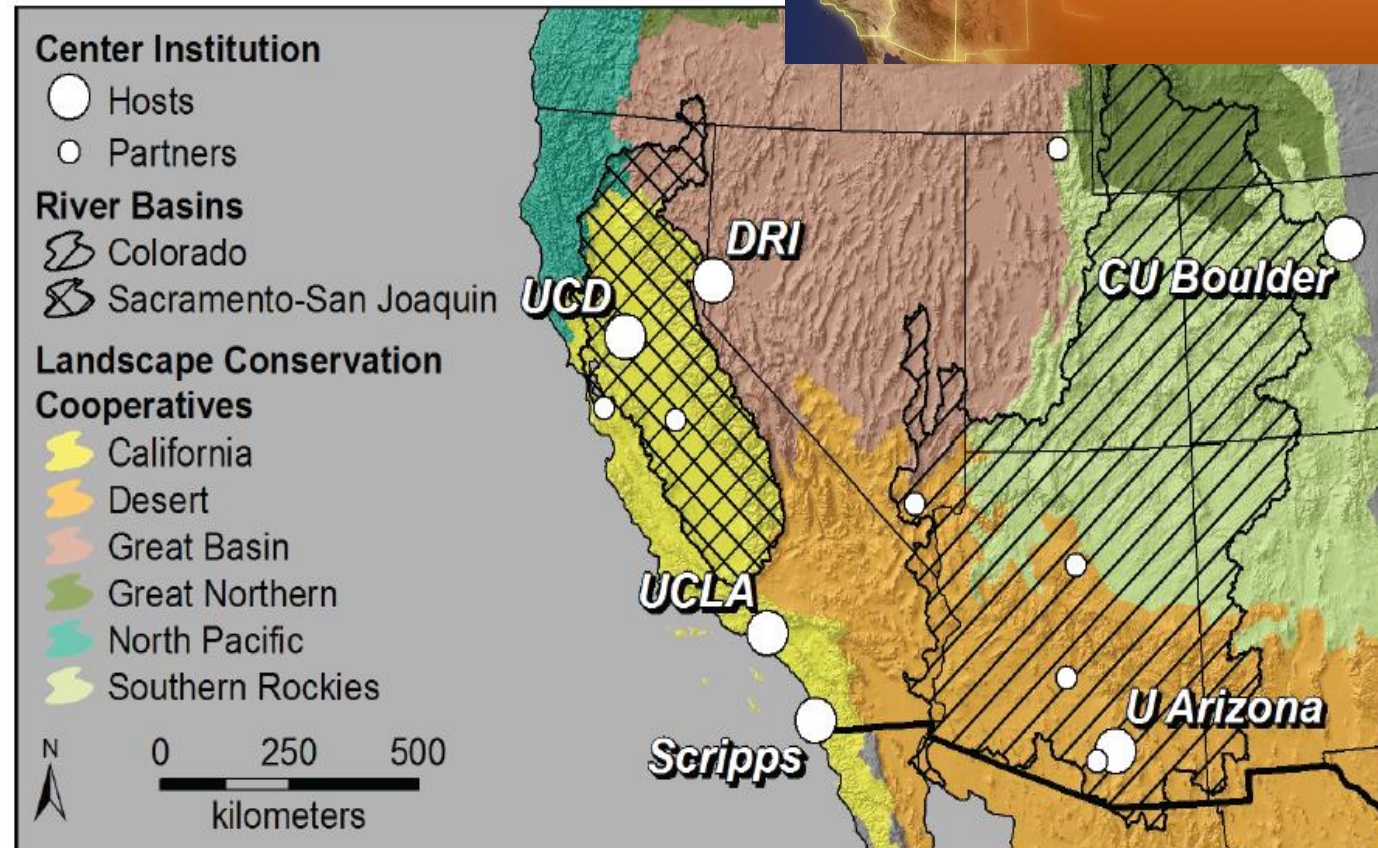


G.M. MacDonald, G.M., Bennett, K.D., Jackson, S.T., Parducci, L., Smith, F.A., Smol, J.P. and Willis, K.J. 2008. Impacts of climate change on species, populations and communities: palaeobiogeographical insights and frontiers Progress in Physical Geography 32, 139-172.



## Multi-Campus and Multi-Regional

*"The consortium...brings a wide range of scientific and impact assessment capabilities to the Southwest Climate Center because it includes institutions located in and familiar with the incredible diversity of ecosystems and human settlements and activities that characterize the U.S. Southwest"* Secretary of the Interior Ken Salazar, October 20, 2010





Includes Authors from -

UCLA  
UC Davis  
UC San Diego - Scripps  
UC Santa Barbara  
University of Arizona  
Arizona State University  
USGS  
USFS

## THANKS!

[www.pnas.org/content/107/50.toc](http://www.pnas.org/content/107/50.toc)

